SIMRAD

PRO SERIES

E5024 ECDIS System
Installation Manual

ENGLISH

PRO.SIMRAD-YACHTING.COM

Preface

As Navico is continuously improving this product, we retain the right to make changes to the product at any time which may not be reflected in this version of the manual. Contact your nearest distributor if you require any further assistance.

It is the owner's sole responsibility to install and use the instrument and transducers in a manner that will not cause accidents, personal injury or property damage. The user of this product is solely responsible for observing safe boating practices.

NAVICO HOLDING AS AND ITS SUBSIDIARIES, BRANCHES AND AFFILIATES DISCLAIM ALL LIABILITY FOR ANY USE OF THIS PRODUCT IN A WAY THAT MAY CAUSE ACCIDENTS, DAMAGE OR THAT MAY VIOLATE THE LAW.

Governing Language: This statement, any instruction manuals, user guides and other information relating to the product (Documentation) may be translated to, or has been translated from, another language (Translation). In the event of any conflict between any

Translation of the Documentation, the English language version of the Documentation will be the official version of the Documentation.

This manual represents the product as at the time of printing. Navico Holding AS and its subsidiaries, branches and affiliates reserve the right to make changes to specifications without notice.

Copyright

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Warranty

The warranty card is supplied as a separate document.

In case of any queries, refer to the brand web site of your display or system:

http://pro.simrad-yachting.com

Declarations and conformance

This equipment is intended for use in international waters as well as coastal sea areas administered by countries of the E.U. and E.E.A.

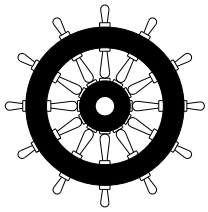
Compliance Statements

The Simrad E5024 ECDIS system;

- complies with CE under EMC directive 2004/108/EC
- complies with the requirements of level 2 devices of the Radio-communications (Electromagnetic Compatibility) standard 2008

For more information refer to our website:

http://pro.simrad-yachting.com



The Wheelmark

The Simrad E5024 ECDIS system is produced and tested in accordance with the European Council Directive 96/98/EC of December 1996 on marine equipment, as last amended by directive 2013/52/EU. This means that the system complies with the highest level of tests for nonmilitary marine electronic navigation equipment existing today.

The Marine Equipment Directive 96/98/EC (MED), as amended by 2013/52/EU for ships flying EU or EFTA flags, applies to all new ships, to existing ships not previously carrying such equipment, and to ships having their equipment replaced.

This means that all system components covered by annex A1 must be type-approved accordingly and must carry the Wheelmark, which is a symbol of conformity with the Marine Equipment Directive.

Navico has no responsibility for the incorrect installation or use of the ECDIS system, so it is essential for the person in charge of the installation to be familiar with the relevant requirements as well as with the contents of the manuals, which covers correct installation and use.

Warning

The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that of the receiver
- Consult the dealer or an experienced technician for help

Trademarks

- NMEA 2000 is a registered trademark of the National Marine Electronics Association
- Navionics is a registered trademark of Navionics SpA
- Simrad is a trademark of Kongsberg Maritime AS Company registered in the US and other countries and is being used under license
- The terms HDMI and HDMI High-Definition Multimedia Interface, and the HDMI Logo are trademarks or registered trademarks of HDMI Licensing LLC in the United States and other countries

About this manual

This manual is a reference guide for installing the Simrad E5024 ECDIS system.

Important text that requires special attention from the reader is emphasized as follows:

➔ ***Note:*** Used to draw the reader's attention to a comment or some important information.

⚠ **Warning:** Used when it is necessary to warn personnel that they should proceed carefully to prevent risk of injury and/or damage to equipment/personnel.

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E5024 System overview

The E5000 Processor features two fast quad core CPUs, and dual monitor outputs to drive two displays with independent information.

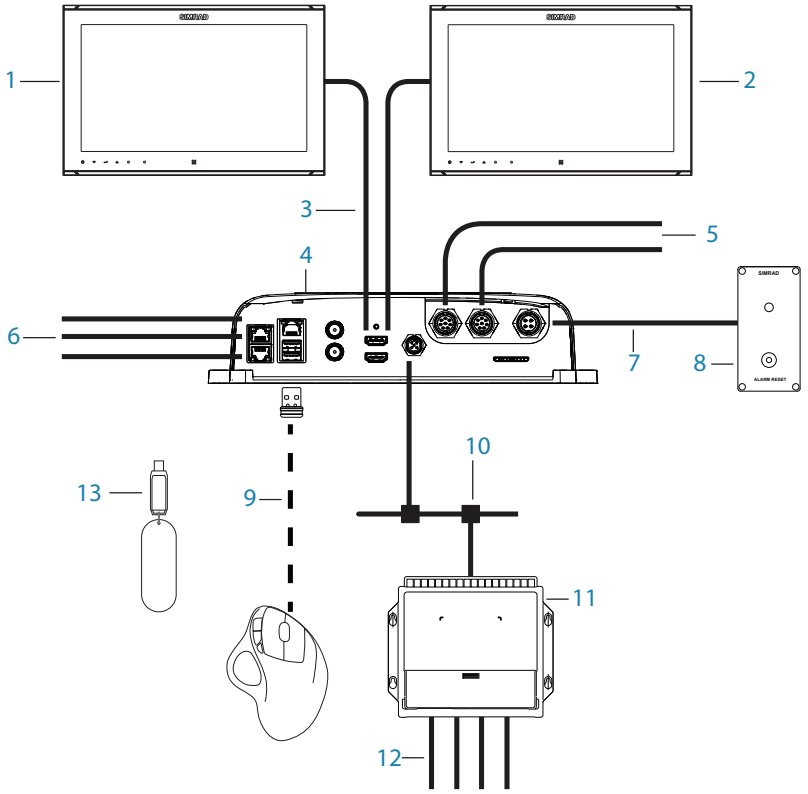
Each quad core CPU operates independently, one running ECDIS software, the other running Navico's NSO evo2 multifunction display software.

Connectivity options for data are broad, with an internal ethernet switch with three ports, NMEA 0183 transmit and receive ports, and a connection point for a NMEA 2000 compliant data bus.

Synchronizing the ECDIS CPU with a backup ECDIS device constitutes a PLECDIS system (PaperLess ECDIS). Integration is possible with Navico ARGUS radar.

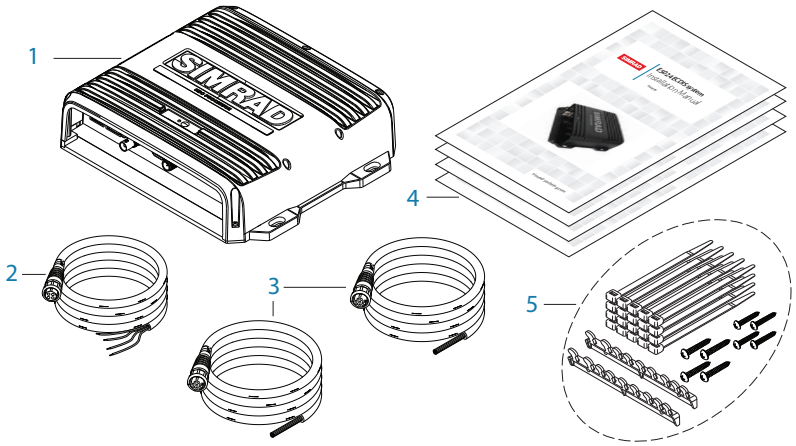
The Simrad M5024 monitor offers a low profile, high brightness solution for displaying video from a variety of sources. M5024 monitors are color calibrated according to ECDIS requirements. For installation and setup refer to the M5000 Series User Manual.

Separate documents are delivered for the NSO evo2. Refer to this documentation for installation, configuration and operation of the NSO evo2 system. The manuals can be downloaded from the product site on http://pro.simrad-yachting.com



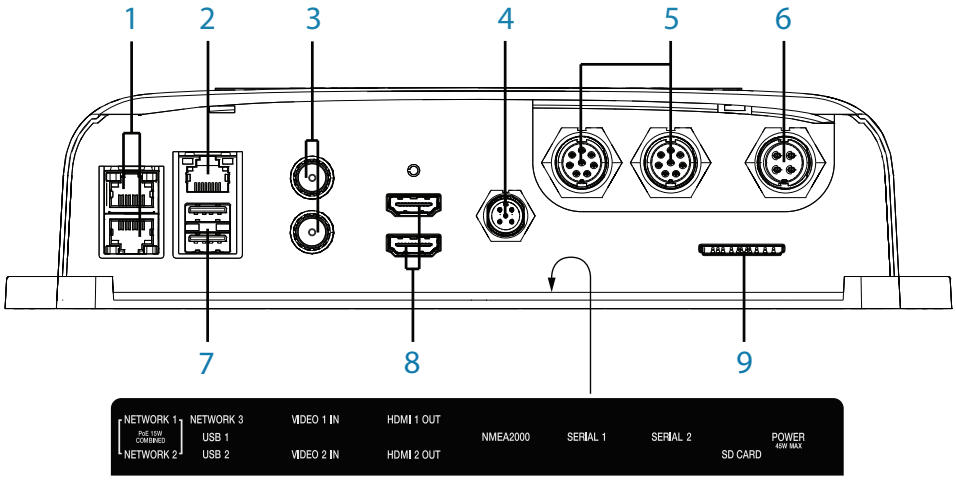
Item	Description
1	M5024 – ECDIS CPU via HDMI 1 OUT
2	MO16/19/24, M5016-24 or other – NSO CPU via HDMI 2 OUT
3	HDMI cables
4	ECDIS Processor – containing ECDIS and NSO CPUs
5	NMEA 0183 – 3 ports for ECDIS CPU, 1 port for NSO CPU
6	Ethernet ports - 2x PoE, 1x standard
7	External alarm (Blue wire) on E5000 power cable
8	E0102 alarm panel – ECDIS CPU only
9	M570 wireless trackball and USB receiver
10	NMEA 2000 network
11	SI80 NMEA 0183 expansion module
12	NMEA 0183 HS ports for sources such as position, heading etc.
13	NavStick

Included items in the E5000 box



Item	Description	Qty
1	E5000 ECDIS processor	1
2	Power cable, 4 core, 2 m	1
3	Serial cable, NMEA 0183, 2 m	2
4	Documentation pack:	
	E5024 Operator manual	1
	E5024 Installation manual	1
	Warranty card	1
5	Installation kit:	
	Cable retainer	2
	Cable ties, 102 mm x 2.5 mm, black	20
	Pan head screws, 19 mm x 3.5 mm, phillips #2	4
	Pan head screws, 25 mm x 4 mm, phillips #2	4

E5000 CPU



#	Description	ECDIS CPU	NSO evo2 CPU
1	Ethernet Network ports with PoE	2 ports - shared	
2	Ethernet Network port	1 port - shared	
3	Video Input BNC sockets	n/a	2 ports
4	NMEA 2000 port	1 port - shared	
5	NMEA 0183 serial	3	1
6	Power connector	shared	
7	USB ports	2	n/a
8	HDMI sockets	1	1
9	SD card slot	1 port - shared	

➔ ***Note:*** For NSO evo2 Installation refer to the separate NSO evo2 Installation Manual.

➔ ***Note:*** On the E5000 hardware there are some differences compared to a normal NSO evo2:

- The USB ports are dedicated to ECDIS and cannot be used in the NSO software
- The alarm output pin is dedicated to the ECDIS software, and will not be triggered by NSO software
- There will only be one free serial input to the NSO software. This can be used for Touch screen OR NMEA 0183 input

2 Hardware installation

Mounting location

Choose the mounting locations carefully before you drill or cut. Be sure to leave a direct path for all of the cables.

Ensure that any holes cut are in a safe position and will not weaken the boat's structure. If in doubt, consult a qualified boat builder.

Before cutting a hole in a panel, make sure that there are no hidden electrical wires or other parts behind the panel.

Do not mount any part where it can be used as a hand hold, where it might be submerged, or where it will interfere with the operation, launching or retrieving of the boat.

Choose an area where the unit will not be subjected to excessive vibration, or heat.

Choose a location that will not expose the unit to conditions that exceed the IP rating.

Leave sufficient clearance to connect all relevant cables.

For compass safe distance check the back of the units.

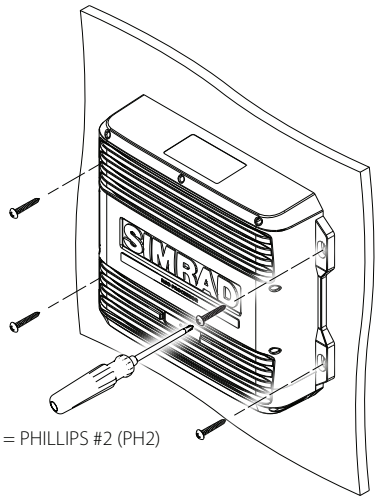
For overall width and height requirements, see *"E5000 Dimensional drawings" on page 39*.

> ⚠ **Warning:** When installing, ensure appropriate safety equipment is used, e.g. ear muffs, protective glasses, gloves and a dust mask.
>
> Power tools may exceed safe noise levels, and can cast off dangerous projectiles.
>
> The dust from many materials commonly used in boat construction may cause irritation or damage to eyes, skin, and lungs.

E5000 processor installation

Hold the processor up to the desired location on the mounting surface, and with a pencil or marker, trace the 'keyhole' at each of the four mounting tabs. Remove the processor and mark the center of the narrow end (top) of each 'keyhole.'

The supplied fasteners can be used when installing the processor to a wooden or fiberglass bulkhead. For steel or aluminium it may be preferable to use machine screws with lock nuts. For supplied fasteners, pre-drill the holes at the marked points with no larger than a 2.7 mm drill bit. When drilling into fibreglass covered in gelcoat, it is recommended to carefully remove the gelcoat layer with a small countersink bit after the hole has been drilled. This will prevent the gelcoat from cracking as the fastener is tightened.



M570 trackball

The M570 is a desktop trackball and can be fixed in place using self-adhesive velcro. Double sided mounting tape is not recommended as it would impede battery replacement. The M570 receiver must be plugged into one of the two USB ports on the E5000 processor.

→ ***Note:*** To fulfill the ECDIS regulations, the trackball must be mounted in an illuminated location!

M5024 series monitor installation

M50xx series monitors include installation instructions and mounting templates that should be carefully read before commencing with installation.

The recommended means to connect the power supply and remote power signal to the E5024 is as follows:

1. The remote power signal is required to be used for a compliant ECDIS system. It is recommended that the remote power signal wire be connected to the main bridge or conning station power circuit. This allows the ECDIS to be powered-up or down using the main power signal circuit on the boat
2. It is further advised that the ECDIS system be powered from a power supply independent from the remote power signal sharing a common ground

→ ***Note:*** Nominal viewing distance is 1m. Do not install monitors in a location where this distance from the operator is exceeded.

E0102 Alarm panel and SI80

Refer to the separate documentation delivered with the units.

LTSX50 trackball (Option)

The optional LTSX50 is a panel mounted, waterproof (IP 68) trackball with scroll wheel. The LTSX50 must be plugged into one of the two USB ports on the E5000 processor. For dimensions see *"LTSX50N8 trackball dimensional drawings" on page 39.*

3 Wiring

For easier access to connectors, undo the two phillips screws visible on the bottom front of the E5000 case, and remove the lower shroud.

Guidelines

Do not do this:	Do this:
Do not make sharp bends in the cables	Do make drip and service loops
Do not run cables in a way that allows water to flow down into the connectors	Do cable tie all cables to keep them secure
Do not route the data cables in areas adjacent to radar, transmitter, or large current carrying cables	Do solder/crimp and insulate all wiring connections, if extending or shortening power or NMEA 0183 cables
	Do leave room adjacent to connectors to ease plugging and unplugging of cables

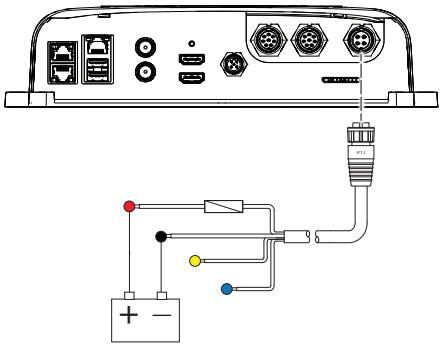
⚠ **Warning:** Before starting the installation, be sure to turn electrical power off. If power is left on or turned on during the installation, fire, electrical shock, or other serious injury may occur.

⚠ **Warning:** Ensure that the voltage of the power supply is compatible with the E5000 Processor.

⚠ **Warning:** The positive supply wire (red) should always be connected to (+) DC with the supplied fuse or a circuit breaker (closest available to fuse rating).

Power connection

The E5000 processor can be powered by either 12 V or 24 V DC. They are protected against reverse polarity, under voltage and over voltage (for a limited duration).



The supplied power cable has four cores:

- Red and Black: power into the system
- Yellow wire: external command
- Blue wire: connecting to an external alarm

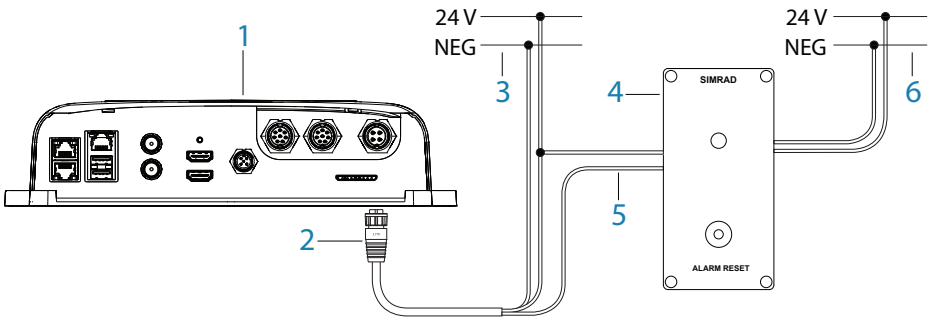
Connect Red to (+) DC using a 3 amp fuse. Connect Black to (-) DC. The processor can be powered on and off using the power button on the front of the case.

➔ ***Note:*** ECDIS requirements demand the system to automatically restart after a power-loss. For ECDIS compliance, yellow wire must be connected to a switch / circuit breaker in such a way that it is running at 12/24V during normal operation.

External alarm

The ECDIS CPU in the E5000 output alarms in the following way:

- The ECDIS CPU pulls the blue wire to GND (O V)



1 E5000 processor

2 Powerplug E5000

3 Main power E5000

4 E0102 Alarm panel

5 Blue alarm pin E5000

6 E0102 separate power

For wiring details for the E0102, refer to the included manual.

➔ ***Note:*** The E5000 processor and E0102 alarm panel must have separate power supplies to be compliant.

Connecting monitors

Two displays may be connected to the E5000 via the HDMI ports.

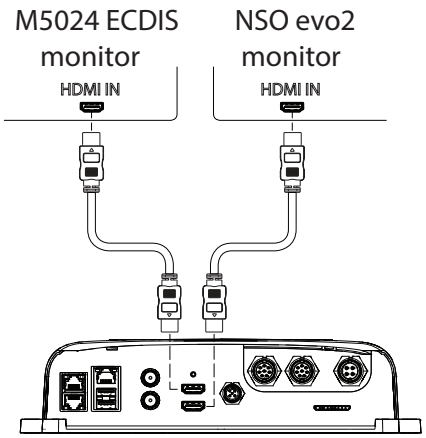
The ECDIS CPU (HDMI 1 OUT) must be connected to a Simrad M5024 to conform to IMO requirements.

The NSO evo2 CPU (HDMI 2 OUT) can connect to a wide range of supported monitors; the Simrad DI-15, MO-L 15/17/19, MO16/19/24 (T&P), legacy MO-19, B&G ZM series, and KEPMGB-15T.

It is possible to use third party monitors on the NSO evo2 CPU, however, these should conform to the supported resolution and refresh rates defined in *"E5000 Processor specifications" on page 38*.

➔ ***Note:*** LCD monitors intended for home/office use are not designed to operate in areas exposed to direct sunlight, and will appear dark and difficult to read. Also, unless carefully ventilated and protected from moisture, their service life will be greatly compromised in the marine environment.

Monitors with a HDMI input may be directly connected to the HDMI 2 output.



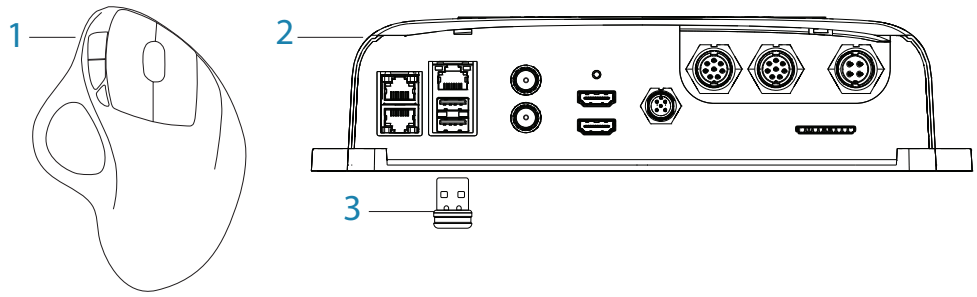
➔ ***Note:*** While the HDMI standard does not state maximum cable length, signal may be compromised on long runs. Only use Navico or other high quality HDMI certified cables. 3rd party cables should be tested before installation. On runs over 10 m it may be required to add an HDMI amplifier or use HDMI-CAT6 adaptors.

Connecting control devices

The ECDIS CPU must be connected to a M570 or LTSX50 trackball for control.

Plug the trackball into either USB port - it will be automatically detected and enabled for use.

M570 and LTSX50 trackball control



1 M570 trackball

2 E5000 processor

3 M570 receiver

→ ***Note:*** Keep spare sets of batteries on hand at all times.

The CAN bus

Device connection

The E5000 processors are equipped with a NMEA 2000 compatible data port, which allows the receiving and sharing of data from various sources.

Essential network information

- The standardized physical cables/connectors for the NMEA 2000 are 'Micro-C' and 'Mini-C', directly derived from the automation industries 'DeviceNET' - 'Micro-C' being the more commonly used size
- While most Simrad products now use 'Micro-C' cabling and connectors, some products still use proprietary 'SimNet' connectors, which are easily made compatible via adaptor cables
- A network consists of a linear 'backbone' from which 'drop cables' connect to the CAN bus compliant devices
- A single drop cable has a maximum length of 6 m (19.7 ft). The total length of all drop cables combined should not exceed 78m (256 ft)
- A NMEA 2000 network using Micro-C cabling, has a maximum cable length of 100 m (328 ft), between any two points
- A NMEA 2000 network needs to have a terminator at each end of the backbone. A terminator can be a terminator blank plug

Planning and installing a network backbone

The Micro-C backbone needs to run between the locations of all products to be installed - typically in a bow to stern layout - and be no further than 6 m from a device to be connected.

Choose from the following components to make up the backbone:

- Micro-C cables: 0.4 m (1.3 ft), 2 m (6.6 ft), 5 m (16.6 ft), and 9 m (29.5 ft) cables
- T-connector. Used to connect a drop cable to the backbone
- Micro-C power cable. Connected to backbone via a T-connector

→ ***Note:*** Most NMEA 2000 devices can be connected directly to a Simrad SimNet backbone and SimNet devices can be connected to a NMEA 2000 network by using adapter cables.

➔ ***Note:*** Simrad devices with Micro-C NMEA 2000 connectors are fully compatible with a SimNet network by using a Micro-C to SimNet adapter cable.

Power the CAN bus

The network requires its own 12 V DC power supply protected by a 5 amp fuse or breaker. For vessels fitted with 24 V systems, use a DC-DC converter to supply 12 V.

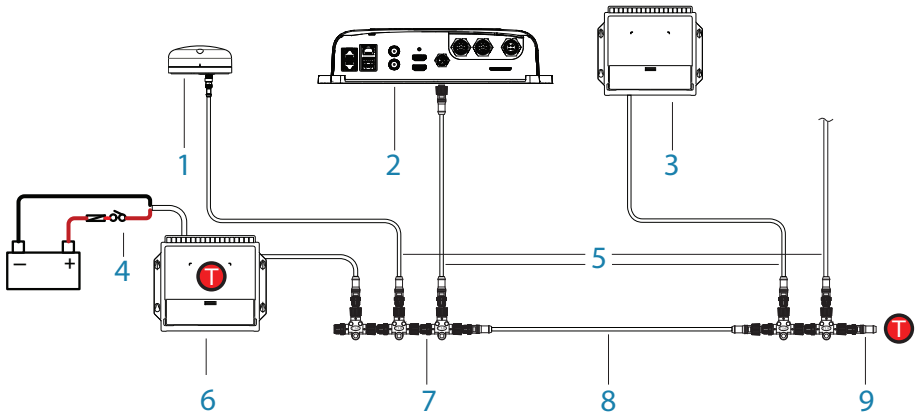
Connect power at any location in the backbone for smaller systems.

For larger systems introduce power at central point in the backbone to "balance" the voltage drop of the network.

If an SI80 unit is included in the system, this unit should be used for powering the CAN bus backbone.

➔ ***Note:*** Do not connect the CAN bus power cable to the same terminals as the engine start batteries, autopilot computer, radar, bow thruster or other high current devices.

When you have a larger system with network power in the center of the backbone you should make the installation such that the load / current draw from the devices in each side / branch is equal.



1 N2K sensor

2 E5000 processor

3 SI80

4 Power source

5 'Drop' cable (should not exceed 6 m (20 ft) each)

6 SI80 module configured with terminator. This SI80 is used to power the CAN bus

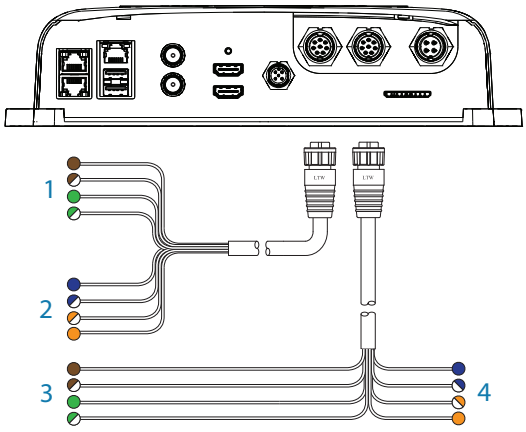
7 T connectors

8 Backbone

9 Terminator

NMEA 0183 device connection

The E5000 processor has four NMEA 0183 ports; three for the ECDIS CPU, and one for the NSO evo2 CPU. Each port supports bi-directional NMEA 0183 traffic. The NMEA 0183 port for the NSO evo2 CPU may be configured for either NMEA 0183 or touch screen control. Both the baud rate and sentences output by both CPUs are configurable.



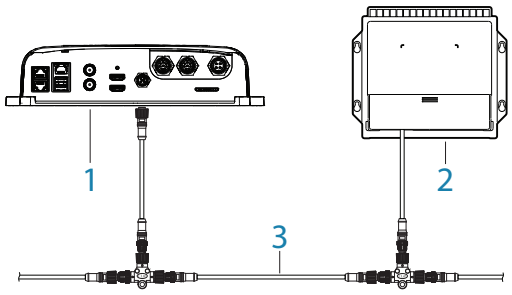
key	connector/ name	colour	signal	CPU	serial ECDIS
1	Serial 1 / 1B	brown brown/white green green/white	NMEA 0183 RX_A NMEA 0183 RX_B NMEA 0183 TX_A NMEA 0183 TX_B	ECDIS	TTYS1
2	Serial 1 / 1A	blue blue/white orange/white orange	RS422_RX+ RS422_RX- RS422_TX+ RS422_TX-	ECDIS	TTYS0
3	Serial 2 / 2B	brown brown/white green green/white	NMEA 0183 RX_A NMEA 0183 RX_B NMEA 0183 TX_A NMEA 0183 TX_B	ECDIS	Serial TCP
4	Serial 2 / 2A	blue blue/white orange/white orange	RS422_RX+ RS422_RX- RS422_TX+ RS422_TX-	NSO	

→ ***Note:*** NMEA 0183 devices communicate at 4800 baud, while NMEA 0183 - HS devices communicate at 38,400 baud. Set the serial port baud rate to the same rate as used by the connected equipment.

→ ***Note:*** AIS is not internally bridged, so it must be connected to one NMEA 0183 port on each CPU if required on both screens.

Additional NMEA 0183 inputs

If more than 3 NMEA 0183 ports or approved high speed NMEA 0183 outputs are required, an SI80 can be connected to the NMEA 2000 network to provide additional ports.



1 E5000 processor

2 SI80

3 Backbone

Connection between the E5000 and SI80 should observe all network connection rules as detailed in *"The CAN bus" on page 12*.

Refer to the SI80 installation guide for details on how NMEA 0183 connections are made.

→ ***Note:*** The SI80 converts NMEA 0183 to NMEA 2000, so source setup should be done as if the data originates from an NMEA 2000 source.

→ ***Note:*** Only data from selected sources will be available for use on ECDIS. For more information refer to *"Websocket interface connection" on page 23.*

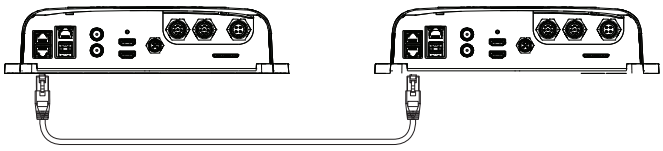
Talkers and Listeners

Do not connect multiple Talkers to any serial input (Rx) of the unit. The NMEA 0183 standard is not intended for this type of connection, and data will be corrupted if multiple devices transmit simultaneously. The output, however, may drive multiple Listeners. The number of receivers is finite, and depends largely on the receiving hardware. Typically driving three devices is possible.

Ethernet device connection

Ethernet is used to interconnect high bandwidth devices such as radar, sonar, and other CPUs. The E5000 processor has three ethernet ports, which are interconnected via an internal ethernet switch.

To achieve a PLECDIS system (PaperLess ECDIS), two E5000 processors must be connected together via ethernet to allow synchronization. The connection can be made using a standard ethernet patch cable with RJ45 plugs at each end.



4 Getting ready to use the system

Installing the charts from the NavStick

The E5024 system is delivered with a pre-installed overview chart. Detailed world-wide charts are available on the NavStick USB drive included with the system. The charts are installed and maintained by using the following services:

- NavTracker - a customized web interface from NAVTOR giving the navigator and ship management full overview of chart usage, chart update history and chart management. The customized NavTracker web interface is created and log-on details submitted to the user when the charts are purchased
- NavSync - a PC program from NAVTOR used for receiving and updating the content on the NavStick

The system allows for installing and using charts in S57 and S63 format from other chart suppliers. Refer to *"Installing charts from other suppliers" on page 18.*

Before the charts can be copied from the NavStick to the E5024 system the following steps must be performed:

1. Submit the User permit code to Navico
2. Verify your chart subscription from the NavTracker web site
3. Update the content of the NavStick to include chart updates and Chart permit codes
4. Copy content of the NavStick to the E5024 system

→ ***Note:*** Step 1 is usually done in the office. The other steps are done when the system is installed and ready for configuration.

The next sections describe the required steps in detail.

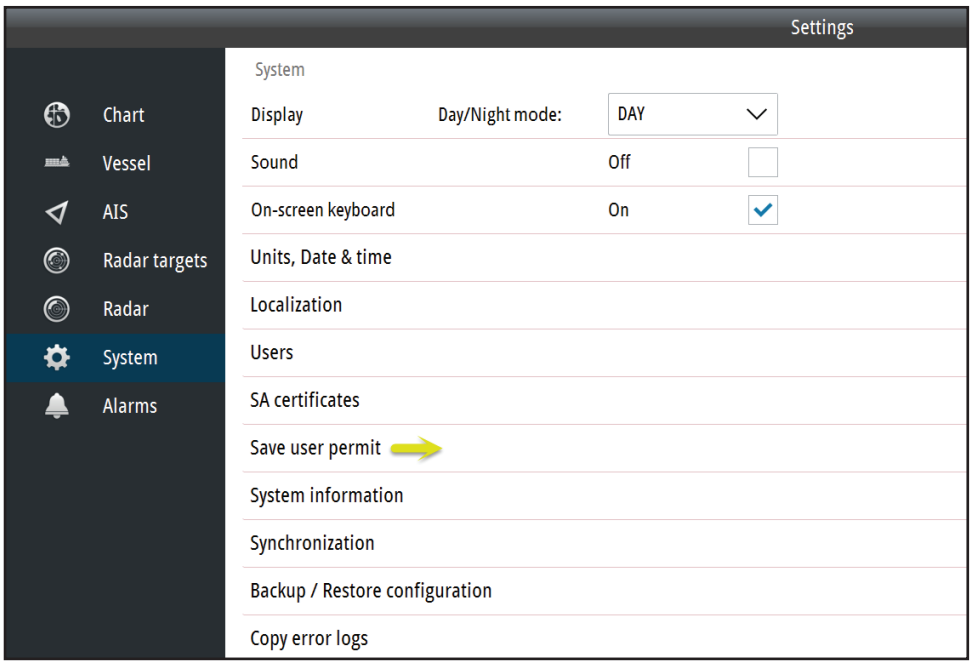
Submitting the User permit code to Navico

A license code has to be obtained from Navico before the charts can be installed from the NavStick. To obtain this code the system's User permit code must be submitted to Navico.

The system's User permit code is automatically generated in the E5000 computer. If the E5000 is replaced, a new User permit code has to be submitted to Navico to be able to use the charts.

Insert a card in the SD card slot or a memory stick in the USB port on the E5000, and save the User permit code from the System Settings dialog. This code is sent to Navico by email at chartservice@navico.com.

→ ***Note:*** You can NOT save the User permit code to the NavStick.



Verifying or changing your chart subscription

When Navico receives the User permit from the vessel and the chart subscription is agreed, Navico creates a custom account and a customized web site in NAVTOR NavTracker. From this web site you can view and manage your subscription.

You log on to this system via a web browser (http://navtracker.navtor.com/) or as an iPhone, iTouch or iPad app. Apps can be downloaded from iTunes Store for iOS or Google Play Store for Android.

1. Log on to the NavTracker
2. Enter your email and password received from Navico when the subscription was agreed
3. Sign in to enter your customized NavTracker web site
4. Download the NavTracker User guide for detailed information about how to use the NavTracker
5. Verify that you subscription is correct, eventually request changes according to the guidelines in the NavTracker User guide

   When completed the NavTracker system will update you subscription information, and chart updates and Chart permit codes for the purchased charts are prepared. These chart updates and Chart permit codes are downloaded to the NavStick by using the NavSync program.

Updating the content of the NavStick

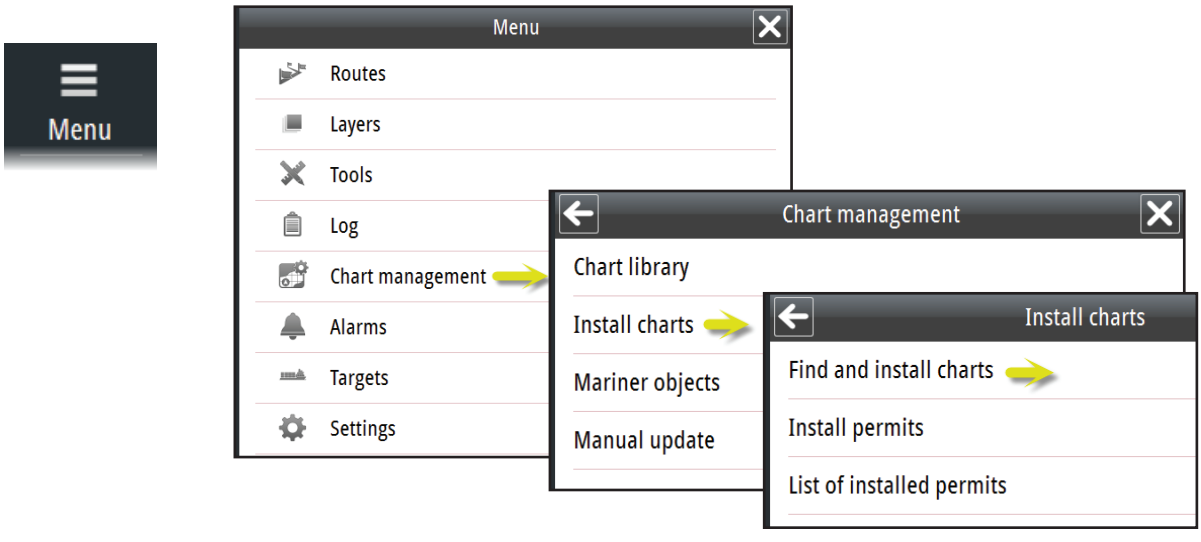
When the chart subscription is agreed, available chart updates and Chart permit codes for the purchased charts are prepared. These files are downloaded to the NavStick by using the NAVTOR NavSync program.

1. Download and install the NavSync program from http://navsync.navtor.com/ on your PC
   - The NavSync icon is added to your desktop when the installation is completed
2. Insert the NavStick in the PC
3. Double-click on the NavSync icon to start the program
4. Follow the instructions on the screen to update the content of the NavStick with the latest available charts

Copying the contents from the NavStick to the E5024 system

1. Insert the NavStick with the charts and the license code into the E5000 processor
2. Open the **Chart managment** menu, and select **Install charts**
3. Select **Find and install charts**
   - The system will now automatically recognize the NavStick and list the content
4. Select the charts you want to install
5. Enter a new name or select an existing name for the SENC geodatabase destination

   Selected charts and license codes are now copied to the E5024 system.



Installing charts from other suppliers

The chart suppliers have different procedure for submitting Chart permit codes and charts. For chart suppliers other than NAVTOR it is required to install Chart permits before charts can be copied to the system. Refer to the supplier documentation for details.

Chart permits are copied to the system by using the **Install permits** menu option.

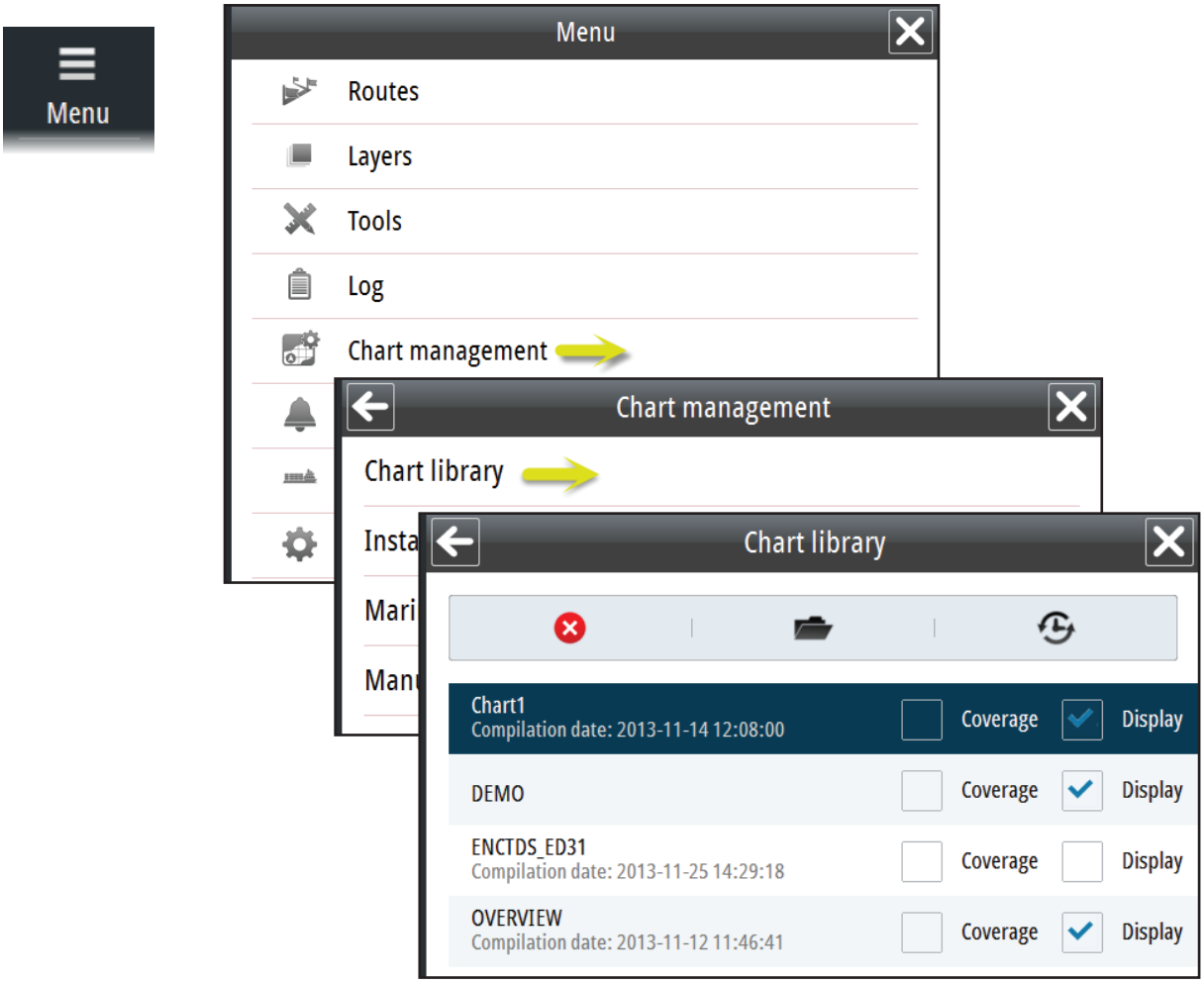
When Chart permits are installed, the charts have to be copied from an USB or SD drive to the E5024 system by using the **Find and install charts** menu option.

Selecting charts to display

All chart databases installed in the E5024 system are listed in the Chart library.

Select the **Display** option for the chart databases you want to use.

If you have more than one database available, you can select to show multiple charts. The system will however only display one chart at the time, and it will automatically select the best chart available based on your vessel's position.



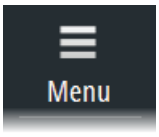
5 ECDIS Software setup

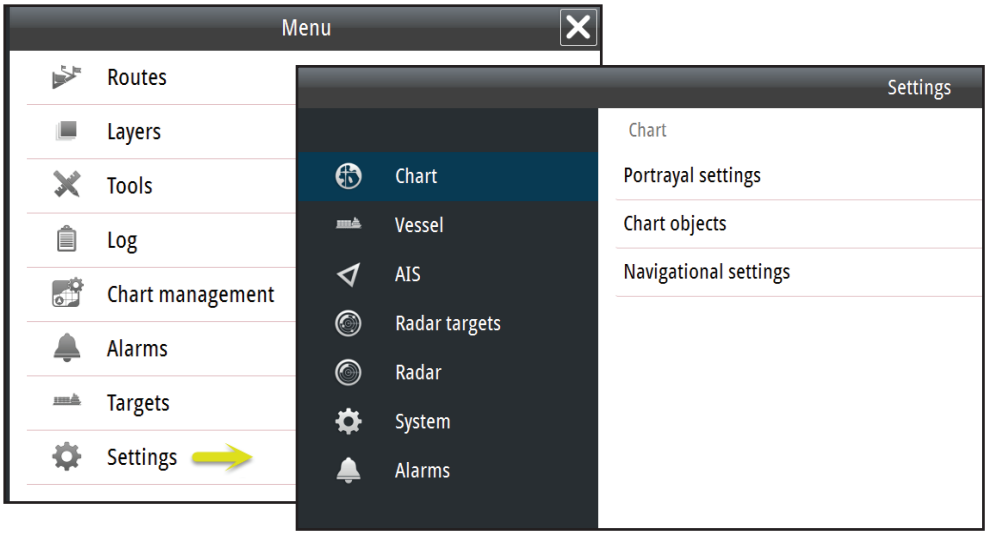
This chapter covers setup of the ECDIS CPU only. See the separate NSO evo2 Installation manual for NSO evo2 setup.

The ECDIS CPU requires setup of critical information such as data sources, vessel dimensions, and radar positioning before use.

The following sections focus on settings that typically will not require change once configured. User preference settings and operation are covered in the operator manual.

The ECDIS settings options are accessed by selecting the **Menu** button. Select **Settings** to view the available settings options.



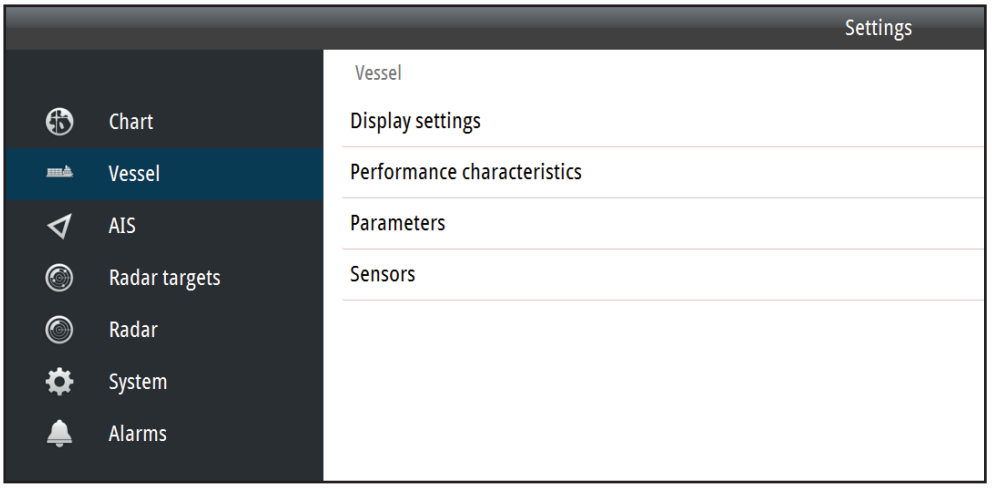


→ ***Note:*** Most screenshots shown have been cropped to optimize display of relevant content.

Chart settings

Refer to the E5024 ECDIS Operator Manual.

Vessel settings

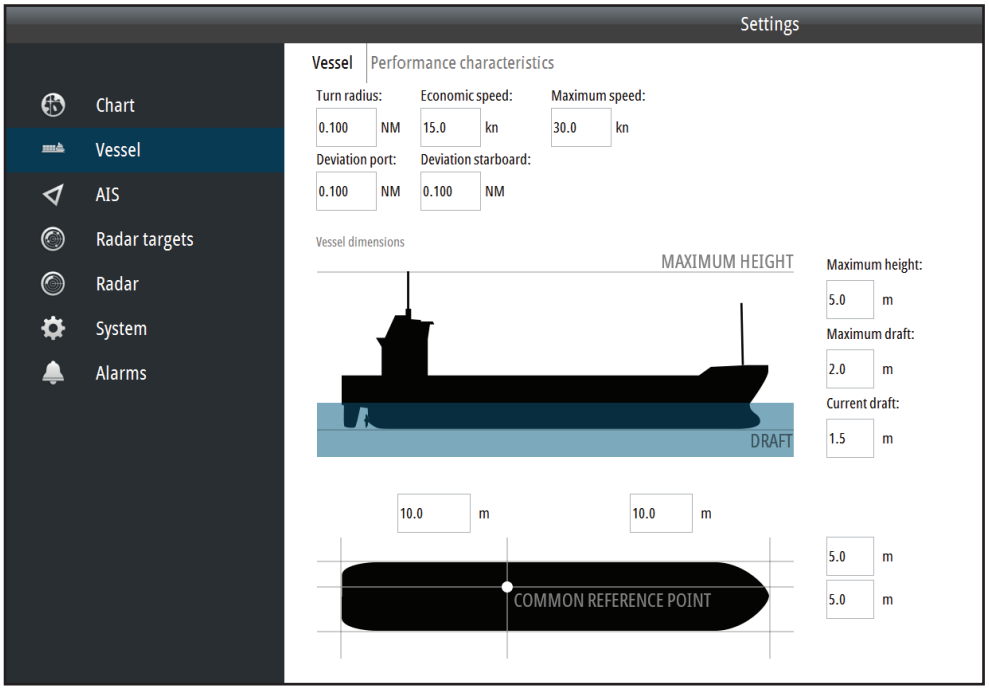


Display settings

Refer to the E5024 ECDIS Operator Manual.

Performance characteristics

Select **Performance characteristics** from the **Vessel** settings to enter vessel specific details.



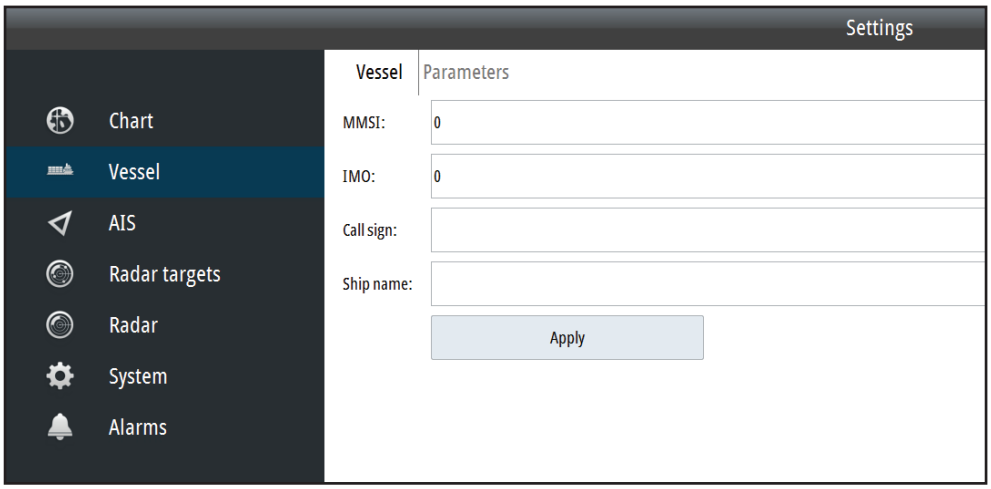
The vessels dimensions are used to draw the ship's outline on the chart approximately to scale. The height, draft, and other performance characteristics constrain the user routes created, and are related to grounding and safety checks.

➔ ***Note:*** The Common Reference Point is a common point selected on the ship (usually the conning station), to which all sensors are referenced to.

The Common Reference Point must be set in relation to the measurements of your own ship. Offset data must be entered correctly to compensate for the offset between the location of your sensors.

Parameters

Select **Parameters** from the **Vessel** settings to enter vessel's unique identification details.



➔ ***Note:*** The MMSI number is required to prevent own vessel's AIS target appearing overlaid on the vessel icon, and causing false alarms as a dangerous target.

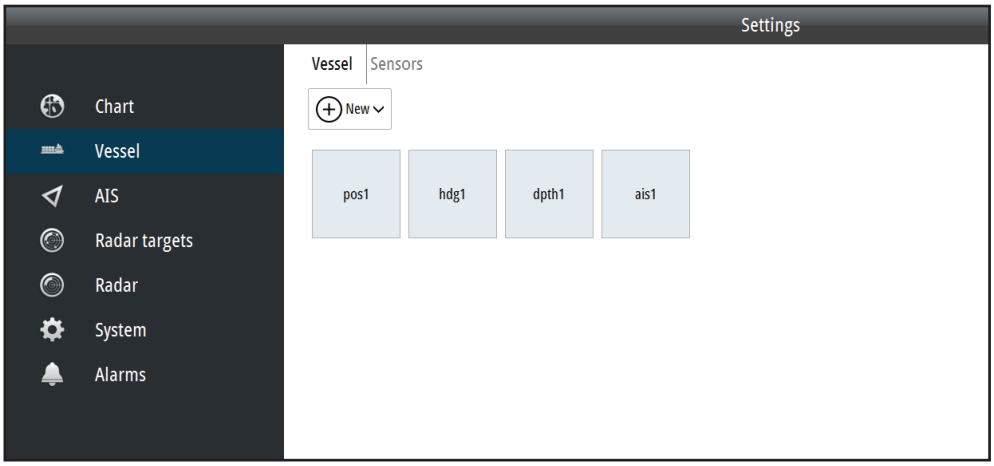
Sensors

The sensors are the external data sources such as GPS, Log, heading sensor, and AIS.

They interface to the E5000 via NMEA 0183, NMEA 2000, and ethernet. Sensors that are connected via NMEA 2000 are bridged internally to ethernet, so selection is made as if the sensors were an ethernet source.

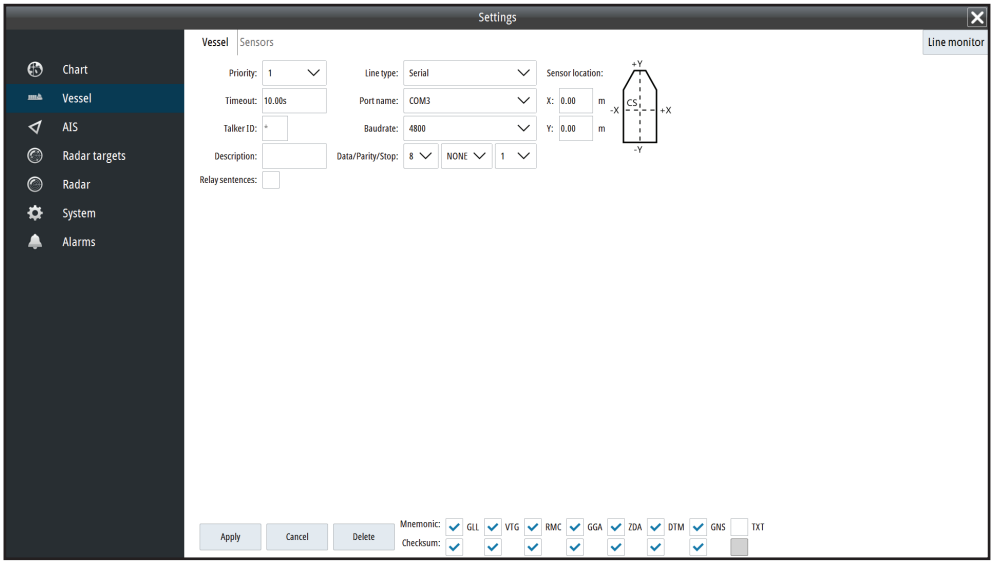
Adding a sensor

On an unconfigured system the sensors page will be blank. Select **New** to add an instance of the sensor type you wish to setup.



Communication settings

Select the newly created sensor icon to edit the communication settings.



The image above shows a typical sensor page. The upper section of the page is similar for all sensors. The **Mnemonic NMEA** sentences (eg GLL, VTG) shown are dependent on the Sensor type selected.

The following describes the settings:

Priority – Priority of the sensor if several sensors of the same type are registered; if the sensor with the highest priority is lost, sensor with the next highest priority is used instead.

Timeout – Time period between the loss of connection with the sensor and triggering the "source lost" alarm.

Talker ID – ID of the sensor used to distinguish between sensors of the same type, or sensors sending the same NMEA sentences. This allows the system to listen only to a specific talker. A wildcard (*) can be used to listen to messages from all sources of the type selected.

Description – Description of the sensor - for identification purposes only.

Relay sentences – Enables vessel sensor parameters information to be relayed through the ethernet connection made in a PLECDIS system.

Line type – The following types of connection are available:

- **Serial** - use to access the **Port name**, **Baudrate** and **Data / Parity / Stop** settings. Port name on the device is always /dev/ttysx ("x" can be 0, 1 or 2). Baudrate and Data / Parity / Stop needs to match the settings of the transmitting device
- **TCP Server** - use to access the **Port** settings
- **TCP Client** - use to access the **Host** and **Port** settings. It it used to collect sensor data from the websocket application or other sources. Only one specific host and port will receive data from the websocket. Other configurations may be used to obtain sensor data from an Ehternet sensor system, for instance another ECDIS or a radar. For more information refer to *"Websocket interface connection" on page 23*
- **UDP Receiver** - use to set the **Host** and **Port** settings which need to match the transmitting device. Use **UDP Receiver** to access ethernet sensors using the UDP protocol
- **UDP Sender** - use to set the **Host** and **Port** settings. Use **UDP Sender** to transmit data using the UDP protocol. The Host should be set to 0.0.0.0 and Port number can be any number between 10002 and 65535
- **Serial TCP** - use to access the **Host** and **Baudrate** settings. This is used to access the 3rd serial port located in the second serial connector. Refer to the Serial 2 / 2B table section in *"NMEA 0183 device connection" on page 14*

Host – IP address of the ethernet device.

Port – Number of the UDP / TCP port to listen to or transmit through.

Sensor location – Position of the sensor on board the own vessel relative to the common reference point.

Mnemonic – NMEA 0183 sentences to listen to.

Checksum – Indicates that checksum of sentences should be checked: if the checksum of a sentence is wrong, the sentence is ignored; if the option is off, all sentences are processed.

NMEA 2000 sensors

The sensors connected via NMEA 2000 are internally bridged to ethernet, and should use the following settings:

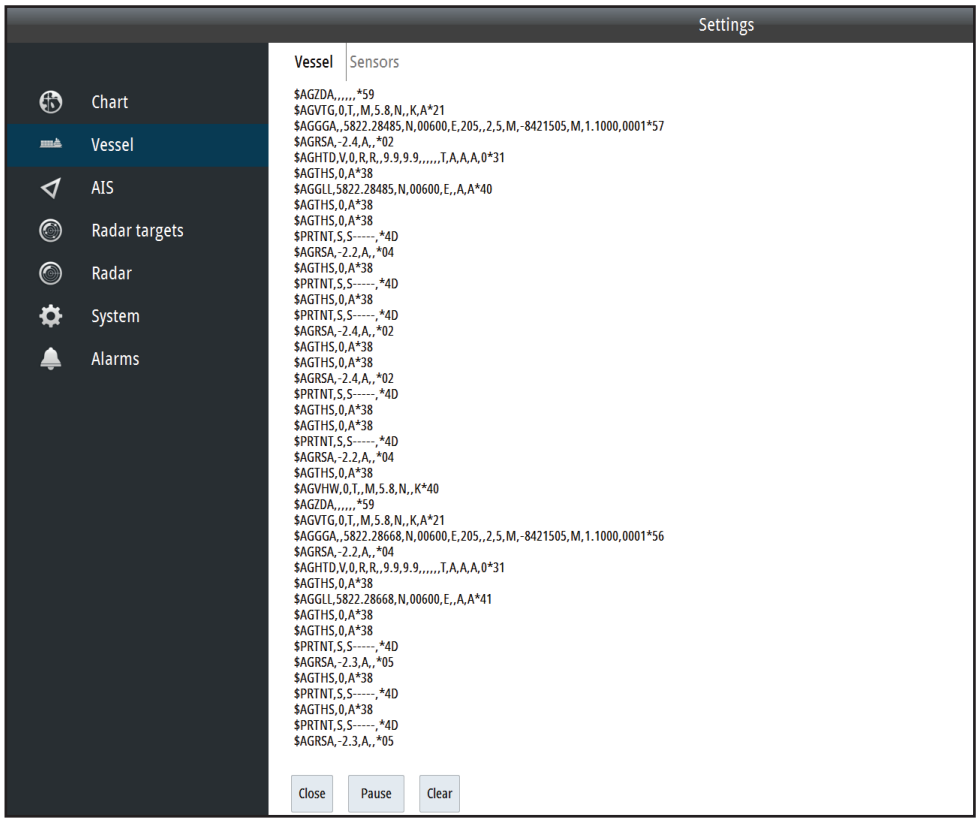
Line type:	TCP client
Host:	127.0.0.1
Port:	2000

Deleting a sensor

To remove a sensor that is no longer required, open the sensor settings by choosing the sensor icon. Select **Delete** at the bottom of the page.

Line monitor - sensor data stream

To check that a sensor is providing data, open the sensor by selecting the sensor icon, then select the **Line monitor** option in the top right corner. The data is shown in raw format, and updated in real-time.



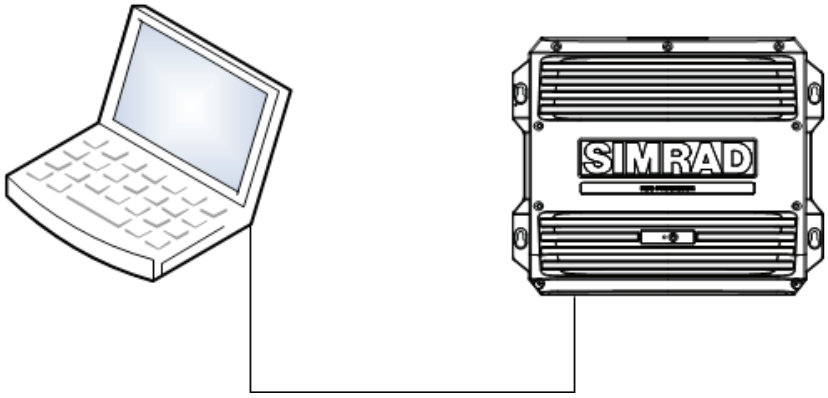
Websocket interface connection

The Simrad web interface is an easy to use web-style portal that lets you configure NMEA 2000 sensors. You can access the Sources, the Device list, and configure most of the hardware available in the system.

➔ ***Note:*** An up to date web browser that supports websockets must be used to access the Simrad web interface.

Connecting to the web interface

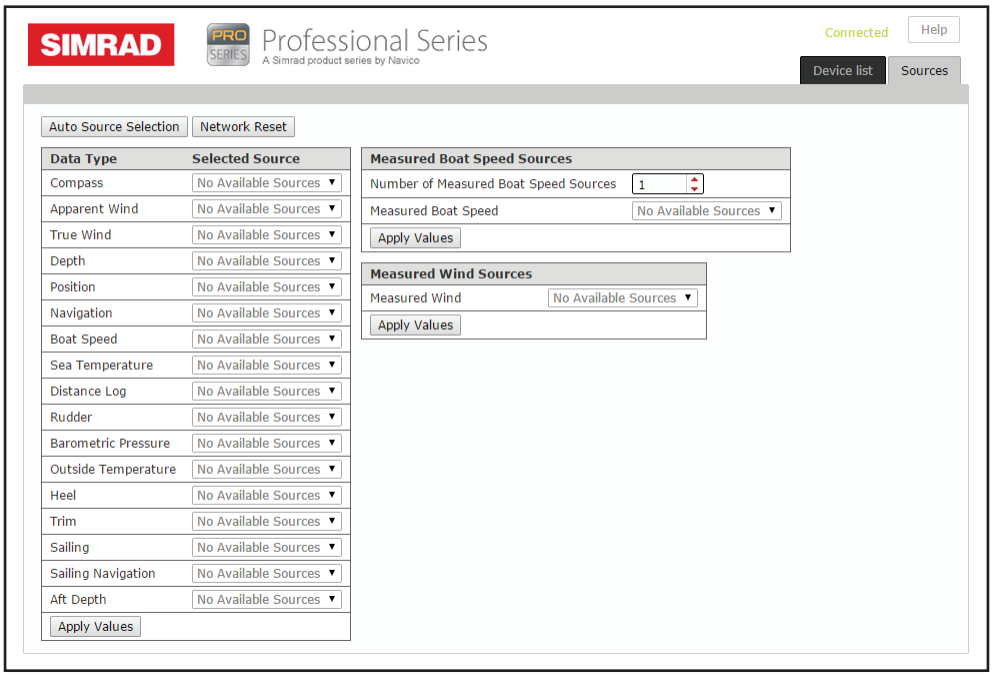
Connect your PC directly to the E5000 via an ethernet cable.



1. Connect the PC to the E5000 via the ethernet port
2. Open web browser on the connected computer or device
3. Find the IP address for the ECDIS system by accessing the **Menu**, then **Settings**, followed by **System**, and **System information** menu
4. Type the IP address into the web browser address bar

→ ***Note:*** Ensure that your computer's network settings are set so you can access this IP address

5. Once connected correctly the Simrad web interface home screen will appear



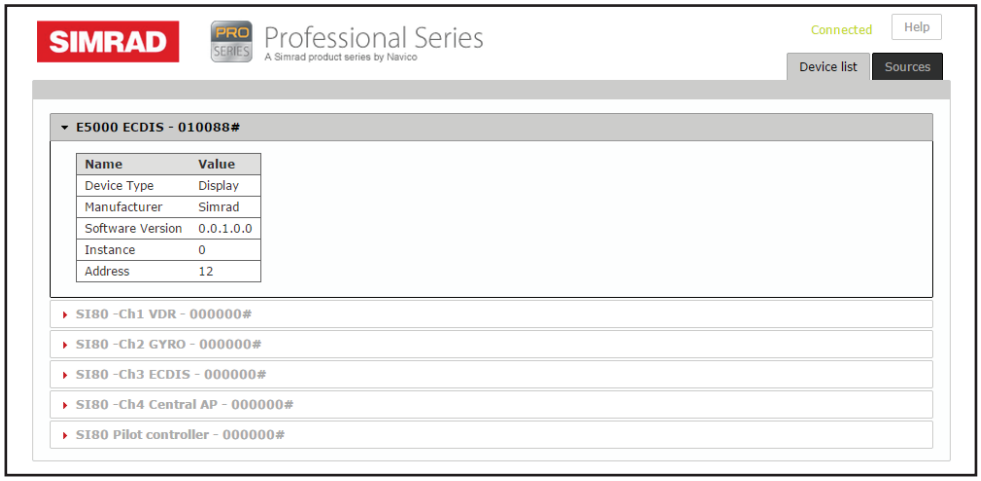
→ ***Note:*** It will say **Connected** in the top right-hand corner of the screen next to the help tab. If it says **Not Connected** then check the E5000 power and connections, and network activity light on both devices.

→ ***Note:*** A notification pop-up appears if your browser does not provide websocket support.

→ ***Note:*** Connection via a network is possible, but to reduce potential issues, a direct connection is preferred.

Web interface menus

The Web interface menu tabs can be found at the top of the web page. Select the desired main menu and the available sub menu tabs will be shown directly below as indicated.



Web interface help files

Selecting the help tab located in the top righthand corner of the screen will show the help files related to the current page or feature.

AIS settings

Refer to the E5024 ECDIS Operator Manual.

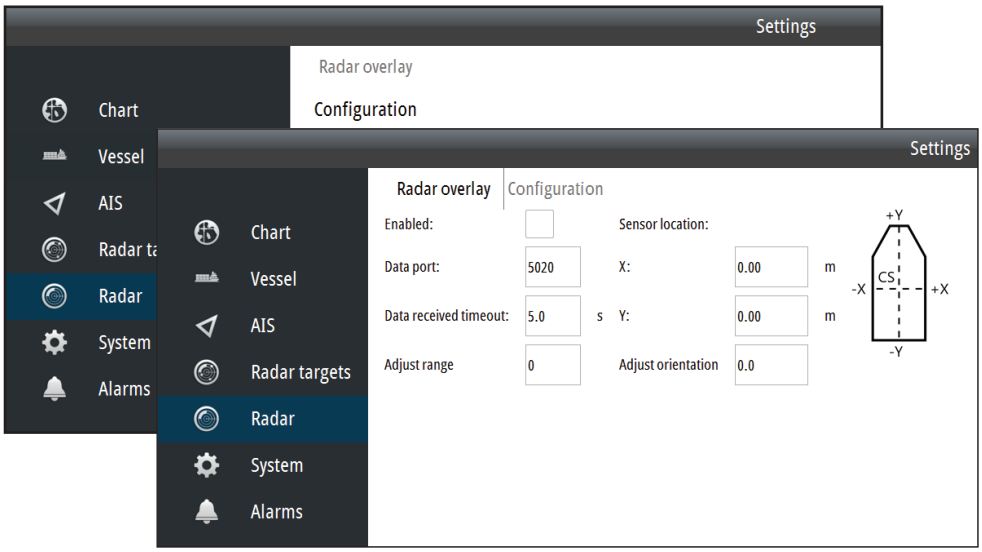
Radar targets settings

Refer to the E5024 ECDIS Operator Manual.

Radar settings

Radar overlay configuration

With a compatible radar connected via ethernet, the radar PPI can be superimposed on the chart screen.

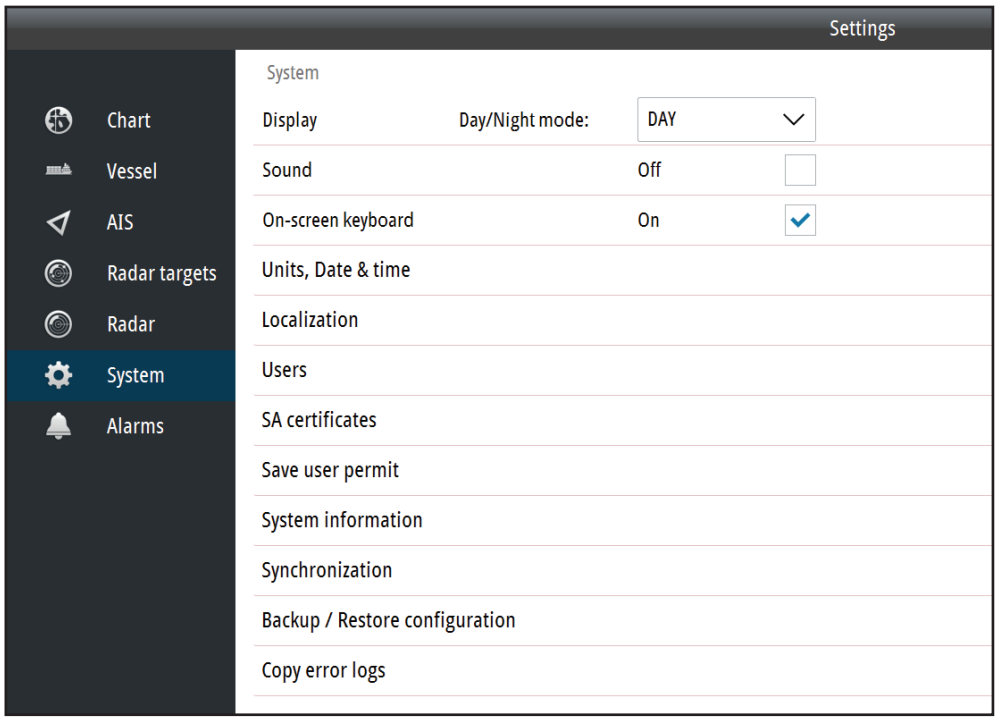


- Check **Enabled** to turn on overlay
- The **Data port** setting should not need adjustment as is set by default for Simrad IMO radar
- Set the **Data received timeout**, to stop overlay if no fresh data is provided
- Set an approximate location on vessel for the radar scanner

➔ ***Note:*** Setting the sensor location for radar is important, as it will influence accuracy of radar PPI placement over chart. This effect will be most noticeable when viewing chart at small scales.

➔ ***Note:*** In order to overlay radar on chart display, a high accuracy heading source must be present.

System settings



Display

Used to change the color palette. For more information refer to the E5024 Operator Manual.

Sound

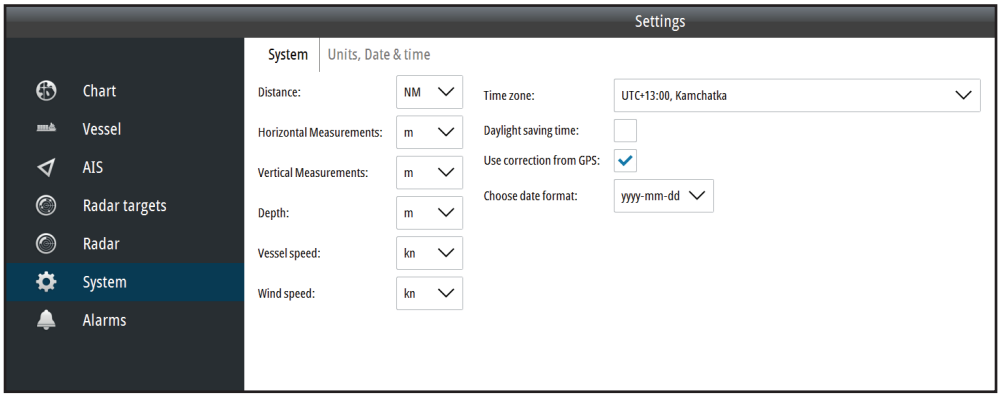
Used to turn the alarm sound **On** or **Off**.

On-screen keyboard

Used to turn **On** / **Off** the virtual keyboard.

Units, date, and time

Set preferred units, and time and date settings.



Localization

Used for selecting the language available.

Users

The master user is the only preconfigured user, and has full access to all settings. If other users are to be added, the first step is to assign a password for the master user. Ensure this password is recorded and securely stored by the vessel's master user.

Additional users can be added, and are automatically given restricted access. Restrictions include inability to edit settings under **Performance characteristics**, **Parameters**, and **Sensors**, which do not require changes in day to day operation.

SA certificates

The S-63 data protection scheme requires a Scheme Administrator certificate, or public key, to be installed on the system. Usually it is pre-installed, but in case the System Administrator issues a new certificate you must be able to install it on the system.

Installing SA certificates

To install an SA certificate:

1. Go to **Settings**, **System**, and then select **SA certificates**. A list of the currently installed SA certificates found in the E5024 ECDIS system will open

→ ***Note:*** When you open the SA certificates panel for the first time after the E5000 ECDIS system launch, the SA certificates launch will start automatically. You can refresh the list using the Refresh button found in the top left corner of the screen.

2. Install an SA certificate by selecting the **Install** button . A window with certificate data will open
3. Compare the data displayed with the SA certificate published on the web-site of the Scheme Administrator and select **OK** if the data are identical or **Cancel** if you find any discrepancies
4. After selecting **OK**, the certificate is installed in the system and a message notifying you about this appears

→ ***Note:*** If you install a newly issued SA certificate, it overwrites the old certificate. If you install an SA certificate from a different Scheme Administrator, it is installed alongside the previously installed certificates.

Deleting SA certificates

To delete an installed SA certificate:

1. Go to **Settings**, **System**, and then select **SA certificates**. A list of the currently installed SA certificates found in the E50024 ECDIS system will open
2. Select the **Delete** button to delete an installed certificate and confirm the operation

Restoring deleted SA certificate

The last deleted SA certificate can be restored. To restore a deleted SA certificate:

1. Go to **Settings**, **System**, and then select **SA certificates**
2. Select the **Restore *.CRT** button and confirm the operation to have the last deleted SA certificate restored

System information

See information about the ECDIS name, ECDIS version, SDK version and Presentation library version.

You can change the ECDIS name by selecting the **Change** button. Select the new pre-defined ECDIS name from the dropdown list when you have more than one ECDIS in the system. Each ECDIS in the system must have a unique name.

PLECDIS

To setup a PLECDIS system two or more E5000 devices need to be connected using a standard RJ45 ethernet cable. After the connection is made you can share sensors, routes, mariner objects, permits and maps from the system setup.

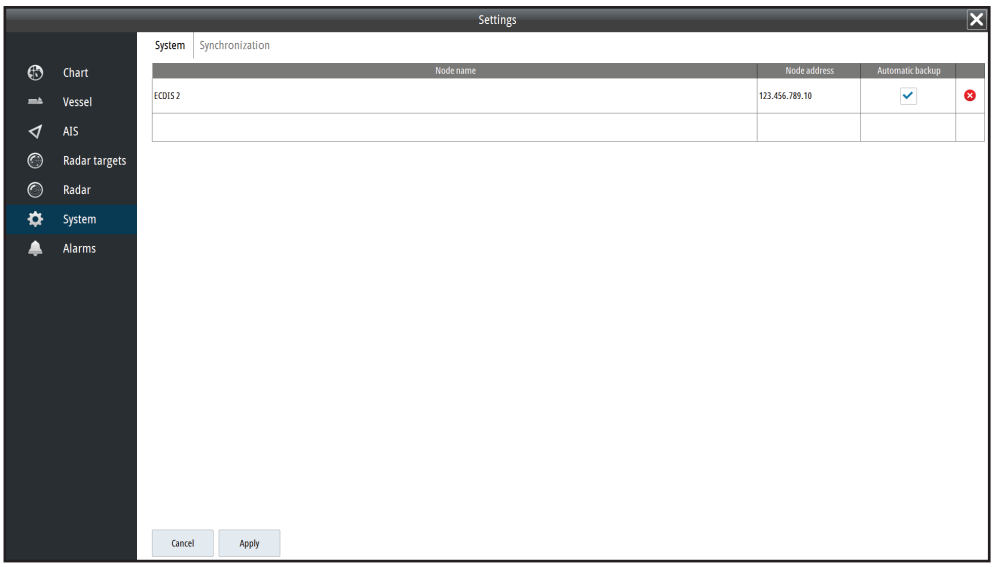
➔ ***Note:*** Setup of a PLECDIS system is described in the Synchronization section of this manual.

Synchronization

When operating the system with more than one ECDIS unit, it is possible to Synchronize data between the systems. When clicking on **Node Name** an ECDIS name will be generated. This name sholud be changed to match the name given to the other ECDIS that you have in your network. It is also required that you input the correct IP address to the other ECDIS units that you want to synchronize to.

If you check the **Automatic backup** the **SENC geodatabases**, **Mariner objects**, **Routes**, **Permits**, and **Configuration files** are synchronized automatically.

➔ ***Note:*** Manual synchronization can be done by accessing the **Menu**, **Tools**, and **Backup arrangement** settings.



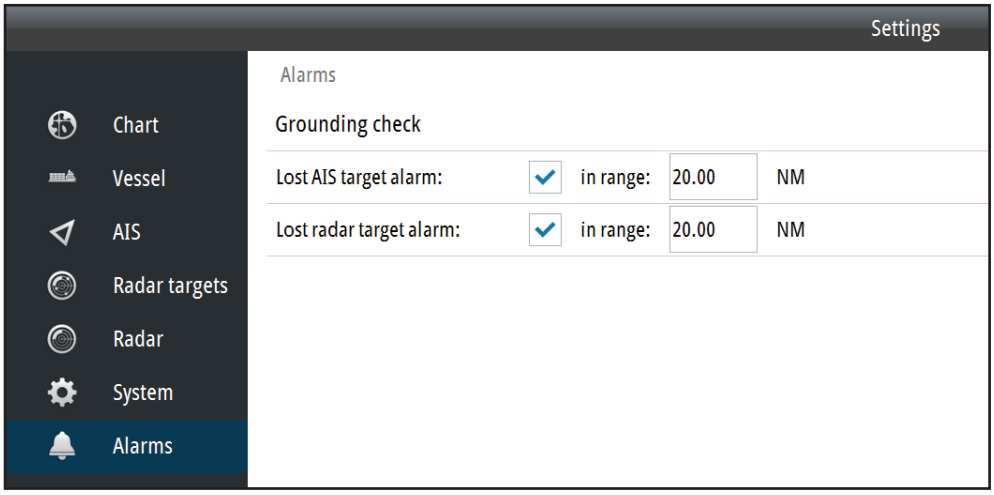
Backup/Restore configuration

From the Backup/Restore configuration you are able to backup/restore all the configurations done to the system. To be able to create a backup you need a USB memory stick or an SD Card.

Copy error logs

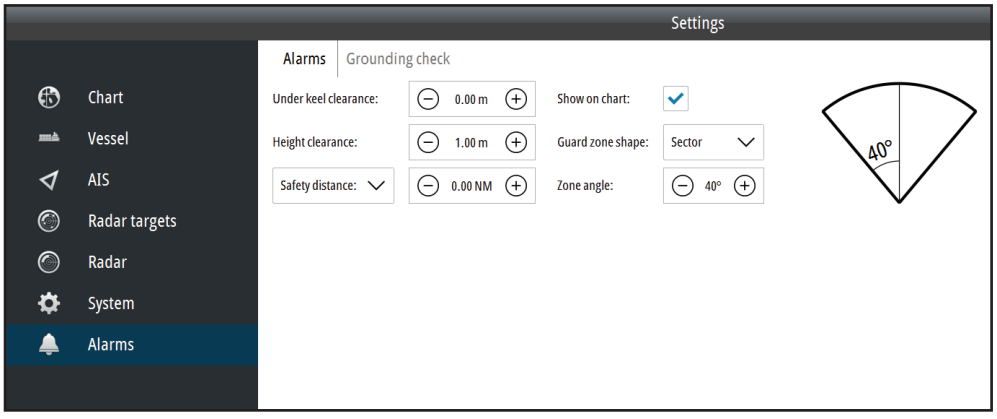
For information refer to the E5024 Operator Manual.

Alarms settings



Grounding check settings

The **Grounding check** function is used to set a guard zone ahead of the own vessel to warn you in case dangerous or caution objects are found inside the guard zone.



→ ***Note:*** A Navigational caution will appear on the screen if dangerous or caution objects are found within the guard zone.

Configuring the settings:

- Set a value in the **Under keel clearance** field, specifying the minimum acceptable margin of depth between the keel and an underwater obstruction
- Set a value in the **Height clearance** field, specifying the height your vessel needs to pass under an overhead object crossing its path

→ ***Note:*** All depth and height values are related to the sounding and vertical datums of the chart under the own vessel. Tides ARE NOT taken in consideration.

- Select a method to calculate the length of the grounding check zone in the methods drop-down list and enter a value to the value field. The following methods are available:
  - **Prediction time** – the zone length is calculated based on the predicted position of the own vessel after a specified period of time
  - **Safety distance** – the zone length is calculated based on the specified distance

  Select a shape for the grounding check zone in the **Guard zone shape** drop-down list. The shapes available are: **Cardioid** and **Sector**.
- If the **Sector** shape is selected, specify the angle of the sector in the **Zone angle** field
- To display the zone on the chart, tick on the **Show on chart** check box. To hide the zone, tick off the **Show on chart** check box

→ ***Note:*** If the guard zone display is on, dangerous objects inside the zone are marked with red, and caution objects are marked with yellow. If the guard zone display is off, objects are not marked.

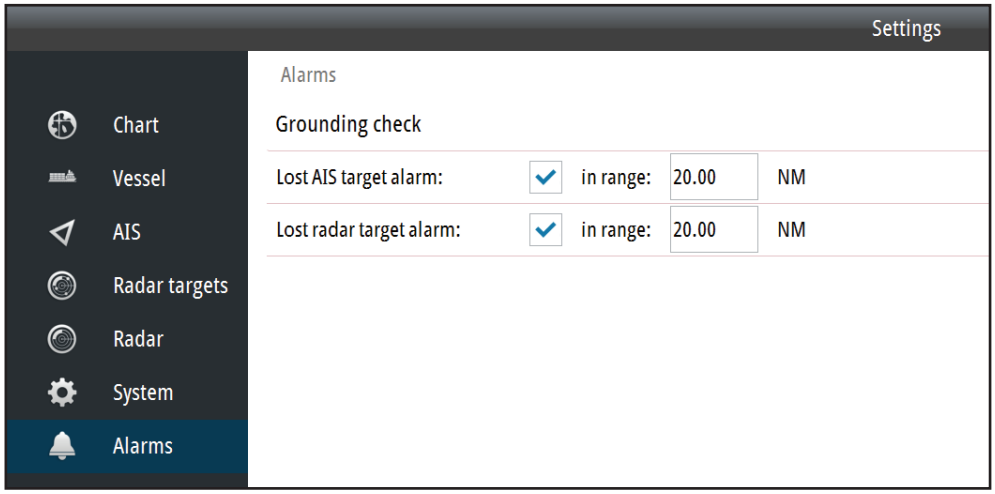
Lost AIS target alarm

ECDIS triggers a visible and audible warning in case an AIS target is lost. When the **Lost AIS target alarm** is ticked on, the system alerts you if any AIS targets are lost within the range specified. Any targets lost outside the specified range will not trigger an alarm.

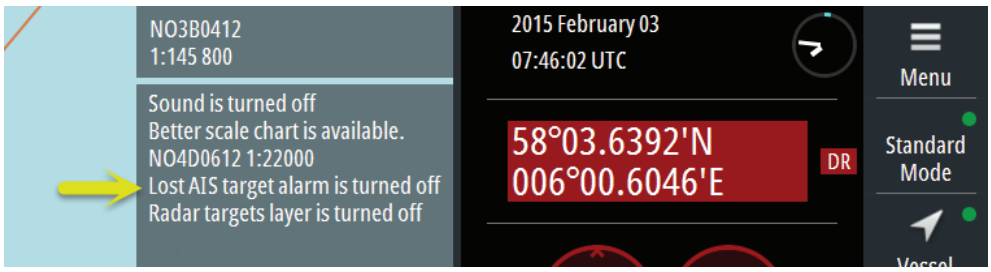
You can select to turn off this alarm filter.

To turn **On** / **Off** the lost AIS target alarm:

Open the alarms panel by accessing the **Menu**, then **Settings**, and **Alarms**.



- To turn the alarm off, tick off the **Lost AIS target alarm** check box. When the alarm is off, an indication is displayed in the chart view



- To turn the alarm on, tick on the **Lost AIS target alarm** check box. The indication is removed from the chart view

Lost Radar Target Alarm

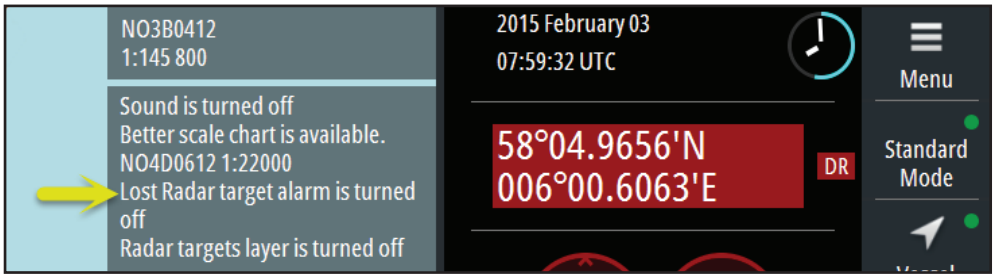
ECDIS triggers a visible and audible warning in case a dangerous radar target is lost. When the **Lost Radar target alarm** is ticked on, the system alerts you if any radar targets are lost within the range specified. Any targets lost outside the specified range will not trigger an alarm.

You can turn off this alarm filter.

To turn **On** / **Off** the lost radar target alarm:

Open the alarms panel by accessing the **Menu**, then **Settings**, and **Alarms**.

- To turn the alarm off, tick off the **Lost radar target alarm** check box. When the alarm is off, an indication is displayed in the chart view



- To turn the alarm on, tick on the **Lost radar target alarm** check box. The indication is removed from the chart view

6 Installation approval

Mechanical Installation

Description	Refer	Yes/No	Comment
All units mounted as described			
E5000			
Monitor			
Trackball/mouse			
External alarm panel			
Ethernet port used			
CAN bus Powered and terminated to instructions			
SI80 Connected			

Power connection

Description	Refer	Yes/No	Voltage
Power connected to E5000			
Power connected to Extenal alarm panel			

External equipment

External equipment connected to Input/ Output from E5000 system	Refer	Yes/No	Baudrate	Type of equipment/ sentence	
Serial 1/1A				input	
				Output	
Serial 1/1B				input	
				Output	
Serial 2/2B				input	
				Output	
SI80 CH1				input	
				Output	
SI80 CH2				input	
				Output	
SI80 CH3				input	
				Output	
SI80 CH4				input	
				Output	

External Ethernet connections	Refer	Yes/No	Type of equipment
Ethernet 1			
Ethernet 2			
Ethernet 3			

7 Spare parts and accessories

E5024 ECDIS system

Part Number	Description
000-11247-001	Serial cable NMEA 0183 8-way 2m
000-11584-001	Serial cable NMEA 0183 8-way 10m
000-11248-001	HDMI cable 3m
000-11249-001	HDMI cable 10m
000-10425-001	SI80 NMEA Signal Interface
000-12375-001	LTSX50N8 trackball black panel mount ECDIS
000-12263-001	NavStick PRIMAR SENC
000-12376-001	NavStick UKHO SENC
000-12262-001	Logitech wireless M570 trackball
151-10380-001	M5024 Monitor (Only Monitor)
000-11781-001	M5024 Monitor
000-11780-001	E5000 ECDIS processor
151-10379-001	E5000 ECDIS processor (Only Processor)
000-00128-001	Power cable for E5000 processor
000-12264-001	E0102 Alarm Panel

NSO evo2 accessories

→ ***Note:*** The latest information about NSO evo2 accessories can be found on the web.

NMEA 2000 compliant data cables

Part Number	Description
000-0124-69	Micro-C starter kit: 120 ohm female terminator cap 120 ohm male terminator cap Micro-C T-piece connector Micro-C 2' (0.61M) extension cable Micro-C 15' (4.55M) extension cable Mirco-C power cable
000-10996-001	Micro-C 4-way T-piece connector
000-0127-52	Micro-C Terminator kit (male and female caps)
000-0119-79	Micro-C T-piece connector
000-0119-75	Mirco-C power cable
000-0119-88	Micro-C 2' (0.61M) extension cable
000-0127-53	Micro-C 6' (1.82M) extension cable
000-0119-86	Micro-C 15' (4.55M) extension cable
000-0119-83	Micro-C 25' (7.58M) extension cable
000-0127-45	SimNet - Micro-C adaptor kit: Simnet cable joiner SimNet to Micro–C male plug, 0.5m (cable for connection of a SimNet device to a Micro-C backbone) Micro-C T-piece connector
24005729	SimNet to Micro–C male plug, 0.5m (cable for connection of a SimNet device to a Micro-C backbone)
24006199	SimNet to Micro-C female plug, 1m (cable for connection of a NMEA 2000 data device to SimNet backbone)
24006413	SimNet to Micro-C female, 4m (13 ft) (cable for connection of a NMEA 2000 data device to SimNet backbone)

Ethernet cables

Part Number	Description
000-0127-51	Ethernet cable yellow 5 Pin 2 m (6.5 ft)
000-0127-29	Ethernet cable yellow 5 Pin 4.5 m (15 ft)
000-0127-30	Ethernet cable yellow 5 Pin 7.7 m (25 ft)
000-0127-37	Ethernet cable yellow 5 Pin 15.2 m (50 ft)
000-11246-001	Ethernet adaptor cable, yellow 5 Pin - RJ45

8 Supported data

ECDIS NMEA 0183 & NMEA 2000 supported sentences

The following data types are supported on E5000	NMEA 0183, either as RS422 or Ethernet		N2k (RX only). All N2k data is translated to NMEA 0183 before used in ECDIS application	
NMEA Sentence	Receive	Transmit	Receive	Translated from PGN
ACK – Acknowledge Alarm	x	x		
ALR – Set Alarm State	x	x		
APB – Heading/ Track Controller (Autopilot) Sentence "B"		x		
DBT – Depth Below Transducer	x		x	128267
DPT – Depth	x		x	128267
DTM – Datum Reference	x			All NMEA2000 Data is in WGS-84 Datum
GGA – Global Positioning System Fix Data	x		x	129025,129029
GLL – Geographic Position – Latitude/ Longitude	x		x	129025,129029
GNS – GNSS Fix Data	x		x	129025,129029
HDT – Heading, True	x		x	127250
MWD – Wind Direction & Speed	x		x	
MWV – Wind Speed & Angle	x		x	
RMC – Recommended Minimum Specific GNSS Data	x		x	127258, 129025, 129026, 129033
ROT – Rate Of Turn	x		x	127251
THS – True Heading and Status	x		x	127250
TLB – Target Label	x			
TLL – Target Latitude and Longitude	x			

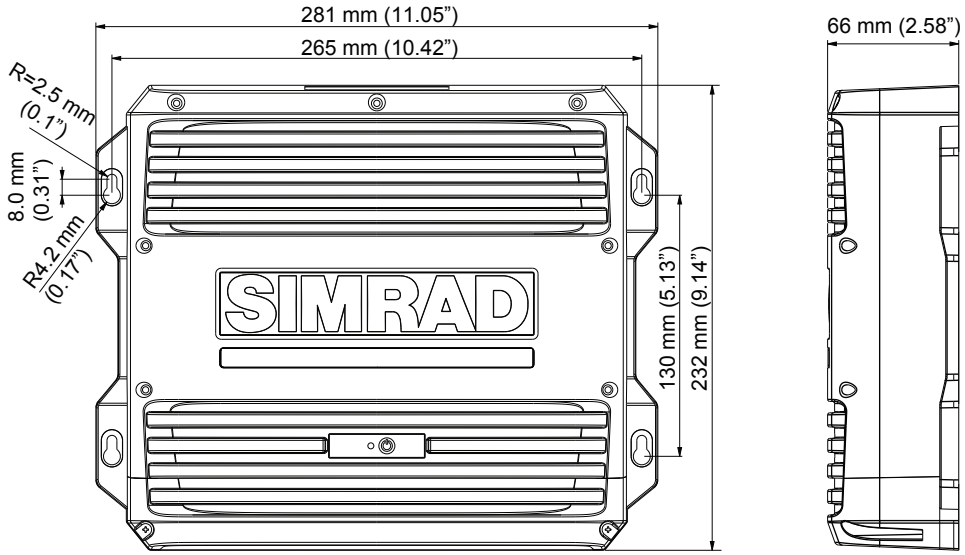
TNT - Proprietary Track steering sentence		x		
TTD – Tracked Target Data	x			
TTM – Tracked Target Message	x			
TXT - supplementary to ALR with more info	x			
VBW – Dual Ground/Water Speed	x		x	128259
VDM – AIS VHF Data-link Message	x			
VDO – AIS VHF Data-Link Own-Vessel Report	x			
VHW – Water Speed and Heading	x		x	127250,128259
VTG – Course Over Ground & Ground Speed	x		x	129026
ZDA – Time & Date	x		x	129033

9 E5000 Processor specifications

Mechanical/Environmental	
Casing	ABS plastic
Operating temp	-15°C to +55°C
Water ingress	IPx2
Weight - processor unit only	1060 grams
Dimensions (overall)	281 mm (W) x 232 mm (H) x 65.5 mm (D)
Electrical	
Operating voltage	9 - 31.2 V DC
Power consumption	45 W max, 1 W off (power connected to +ve supply)
Low power standby mode	yes
Protection	reverse polarity and temporary over-voltage to 36V
Alarm output current	1 A
CPUs	iMX61 quad core (x2)
RAM	DDR3 1GB
Storage	16 GB ECDIS / 8 GB NSO evo2
Conformity	CE, C-Tick, HDMI
Interfaces	
Ethernet	3 ports total - 1 & 2 are PoE (RJ45 socket)
NMEA 2000 (compliant)	1 port on rear (Micro-C male, LEN = 1)
Video input	2 ports on rear (BNC female. NTCS or PAL format)
Video output for NSO evo2 (60Hz nominal)	800x600 (SVGA 4:3) 1024x768 (XGA 4:3) 1280x720 (HD 16:9) 1366x768 (WXGA) 1920x1080 (Full HD 16:9) 1920x1200 (WUXGA 16:10) 1280x800 (16:10) 1280x1024 (SXGA 5:4)
Video output for ECDIS (60Hz nominal)	1920x1080 (Full HD 16:9)
USB	mass storage (Type A socket)
SD	32GB (Full size SD card socket)
NMEA 0183 port baud rate	4800, 9600, 19200, & 38400 (via proprietary cable)
RS422 port baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Charting support	E5024 ECDIS system: S57 or S63 approved ENC charts NSO evo2: Refer to NSO evo2 Operator Manual

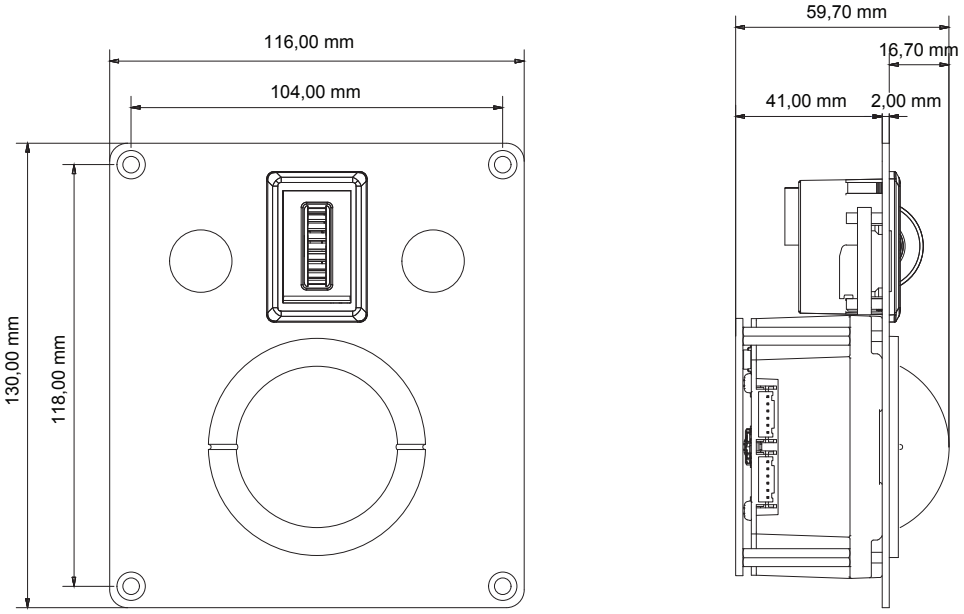
10 Dimensional drawings

E5000 Dimensional drawings



→ ***Note:*** The dimensional drawings for the monitor and alarm panel are found in a separate document.

LTSX50N8 trackball dimensional drawings



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